

# AN ROINN OIDEACHAIS

(Department of Education.)

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INTERMEDIATE CERTIFICATE EXAMINATION, 1947.

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## SCIENCE (Syllabus A).

WEDNESDAY, 18th JUNE.—MORNING, 10 TO 12.

[Not more than *six* questions are to be attempted, of which *three* must be taken from Section I, and *three* from Section II. Illustrate your answers wherever possible. All questions are of equal value.]

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### SECTION I.

1. Describe fully (a) how you would measure the extension produced in a spiral spring by different loads, (b) how you would then draw a graph to show the relationship between load and extension.

Draw a diagram to show the shape of the graph, and explain how the graph will enable you to weigh a given object by means of the spring without using a known weight.

2. State the Principle of Archimedes, and explain in detail how you would use it in the laboratory to find (a) the volume of a given object, (b) the specific gravity of a given liquid.

3. Explain what is meant by radiation of heat and give an everyday example to illustrate your answer.

Describe experiments to show that a black surface (a) absorbs, (b) radiates heat better than a white one.

[One experiment in each case will suffice.]

4. Distinguish between quantity of heat and temperature and state the units in which they are measured.

Describe in detail how you would find, by experiment, the specific heat of a given liquid. Show clearly how you would calculate the specific heat from the measurements made in the experiment.

5. Sketch the apparatus you would use to obtain a current of steam for the purpose of measuring the latent heat of steam in the laboratory.

What is meant by saying that the latent heat of steam is 540 calories per gram ?

A beaker, weighing 50 grams, contains 100 grams of a liquid at  $15^{\circ}\text{C}$ . If the specific heats of the liquid and beaker are 0.6 and 0.12 respectively, find the weight of steam at  $100^{\circ}\text{C}$ . which must be passed into the beaker in order to raise the temperature of the contents to  $45^{\circ}\text{C}$ .

## SECTION II.

6. Describe how you would prepare a few gas jars of oxygen, and write down the properties of oxygen.

Write a brief historical note on the discovery of oxygen and refer to the importance of this discovery.

7. Sketch the apparatus you would use, and describe carefully how you would use it, to measure the volume of hydrogen at room temperature and at atmospheric pressure which would be liberated by the action of a certain weight of zinc on dilute sulphuric acid.

Show clearly how you would then proceed to calculate the equivalent weight of zinc from the measurements made in the experiment.

8. Describe and explain what may be observed when

- (a) a crystal of blue stone is heated,
- (b) hydrochloric acid is poured on a piece of limestone,
- (c) a piece of sodium is added to water,
- (d) burning magnesium is plunged into a jar of carbon dioxide,
- (e) a lighted taper is plunged into a jar of hydrogen.

9. What do you understand by (a) mass, (b) weight, (c) force, (d) lever?

Given a stick, a known weight and some thread, describe how you would find the weight of the stick.

A bar of iron AB, 6 ft. long, rests horizontally on two supports, one at each end. The thrusts on the supports at A and B are 50 lb. and 30 lb. respectively. Give the weight of the bar and find the distance of its centre of gravity from the end A.

Where must a mass of 80 lb. be suspended from the bar so that the pressures on the supports may be equal?

10. How and in what units is work measured in mechanics? State the Principle of Work and describe any experiment you have performed to test it.

Explain the difficulty of obtaining satisfactory results from your experiment.